LETTUCE (*Lactuca sativa* 'Raider')
Fusarium wilt; *Fusarium oxysporum* f. sp. *lactucae*

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Evaluation of conventional fungicides and biofungicides for managing Fusarium wilt of lettuce, 2016.

Two trials were conducted, each in a different grower's field naturally infested with *Fusarium oxysporum* f. sp. *lactucae*, to assess crop protection products (conventional as well as biologically based materials) for their potential in reducing the severity of Fusarium wilt of lettuce. The soil in each field was a silty clay loam. Lettuce 'Raider' was seeded in double rows 12 in. apart on beds with 42 in. centers, then sprinkler-irrigated to germinate seed on 8 Sep and 21 Sep for trial 1 (located in Wellton, AZ) and trial 2 (located in Yuma, AZ), respectively. Plants were thinned 3 Oct in Wellton and 4 Oct in Yuma to an approximate spacing of 11 inches. At both locations, each treatment was applied to four 75-ft-long plots, arranged in a randomized complete block design. Treatments were applied with a CO_2 backpack sprayer that delivered 50/gal per acre at 40 psi to flat-fan nozzles. Treatments were applied in a 4-inch band over each seed line. For most treatments, the first application was made after seeding and before the germination sprinkler irrigation. Specific timing and rates of application for each treatment are noted in the table below. Each plot contained approximately 160 lettuce plants. Symptoms of Fusarium wilt, including stunting and chlorotic leaves, were first observed at thinning at the Wellton location and about a month after thinning at the Yuma site. Disease severity was recorded at crop maturity (17-18 Nov in Wellton and 5-6 Dec in Yuma) by counting the number of lettuce plants in each test plot that were dead, chlorotic, or stunted due to infection by *Fusarium oxysporum* f. sp. *lactucae*. Disease severity data were subjected to analysis of variance (ANOVA), then compared for significance using Fisher's Protected LSD test. Research plots at both locations were managed using customary commercial fertilization, insect management, and irrigation practices. Maximum and minimum daily soil temperatures (EF) at the 4 inch depth recorded at a nearby University of Arizona AZMET (Arizona Meteorological Network) weather station were as follows -- for the Wellton site: 93-82 during 9-30 Sep; 86-79 during Oct; and 76-67 for 1-18 Nov, and for the Yuma site: 88-83 during 21-30 Sep; 88-78 during Oct; 77-59 during Nov; and 61-59 during 1-6 Dec. Total rainfall during the trial period was 0.00 and 0.05 inches for the Wellton and Yuma locations, respectively.

In each trial, none of the treatments as applied and at the rates used significantly reduced the percentage of lettuce plants affected by Fusarium wilt when compared with plants in nontreated plots.

Treatment and rate of product/A	Trial 1 (Wellton)		Trial 2 (Yuma)	
	Days after first application[z]	Percent diseased plants	Days after first application[z]	Percent diseased plants
Taegro 2 4.0 oz + Bio-Tam 3.0 lb	0, 18	82	0, 13	5
Taegro 2 4.0 oz	0, 18	84	0, 13	8
Manzate Pro-Stick 2.0 lb	0	85	0	-------
Bio-Tam 3.0 lb	0, 18	85	0, 13	7
Actigard 1.0 oz	26, 45	85	13, 29	7
Manzate Pro-Stick 3.0 lb	0	86	0	6
Serenade Soil 4.0 qt	0, 18	86	0, 13	6
Proline 5.7 fl oz	0, 18	88	0, 13	6
A19649B 8.6 fl oz	0, 18	89	0, 13	8
LifeGard 2.2 oz	0, 18	89	0, 13	6
Double Nickel 2.5 pt	0, 18	89	0, 13	6
A19649B 8.6 fl oz + Actigard 1.0 oz	0, 18	89	0, 13	6
SP2700 33.0 oz SP2700 22.0 oz	0 26	89	------- 	-------
Actigard 1.0 oz	0, 18	89	0, 13	6
Mycostop 0.7 lb	0	90	-------	-------
Rootshield Plus 2.7 lb	0	90	0	6
Promax 1.0 gal Promax 0.5 gal	0 26	91	0 21	6
Rootpak 2.3 lb	0	91	-------	-------
Vesta 200 gal Vesta 150 gal	26 -------	92	0 6	6
Actinovate 0.7 lb	0	92	0	7
Bio Tek 1.1 lb	0	92	0	6
Nontreated control	-------	91	-------	9

[z] First application date was 8 and 21 Sep in the Wellton and Yuma trials, respectively.

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Evaluation of lettuce varieties for resistance to Fusarium wilt, 2016.

Two trials were conducted, each in a different grower's field naturally infested with *Fusarium oxysporum* f. sp. *lactucae*, to evaluate lettuce varieties currently available or in development for their relative resistance to Fusarium wilt. The soil in each field was a silty clay loam. Lettuce was seeded in double rows 12 in. apart on beds with 42 in. centers, then sprinkler-irrigated to germinate seed on 8 Sep and 21 Sep for trial 1 (located in Wellton, AZ) and trial 2 (located in Yuma, AZ), respectively. Plants were thinned 3 Oct in Wellton and 4 Oct in Yuma to an approximate spacing of 11 inches. At the Wellton location, 13 lettuce varieties (9 crisphead, 4 romaine) were planted in 75-ft-long plots, with four replicate plots per lettuce variety. At the Yuma location, 20 lettuce varieties (18 crisphead, 2 romaine) were planted in plots 75 ft in length, with six replicate plots per variety. Each plot contained about 160 plants in both locations. Plots were arranged in a randomized complete block design to facilitate statistical analysis of data collected. Maximum and minimum daily soil temperatures (EF) at the 4 inch depth recorded at a nearby University of Arizona AZMET (Arizona Meteorological Network) weather station were as follows: Wellton site; 93-82 during Sep 9-30; 86-79 during Oct; and 76-67 for Nov 1-18; Yuma site; 88-83 during Sep 21-30; 88-78 during Oct; 77-59 during Nov; and 61-59 during 1-6 Dec. Total rainfall during the trial period was 0.00 and 0.05 inches for the Wellton and Yuma locations, respectively. Symptoms of Fusarium wilt, including plant stunting and chlorotic leaves, were first observed at thinning at the Wellton location and about a month after thinning at the Yuma site. Disease severity was recorded at crop maturity (17-18 Nov in Wellton and 5-6 Dec in Yuma) by counting the number of lettuce plants in each test plot that were dead, chlorotic, or stunted due to infection by *Fusarium oxysporum* f. sp. *lactucae*. Disease severity data were subjected to analysis of variance (ANOVA), then compared for significance using Fisher's Protected LSD test. Research plots at both locations were managed using customary commercial fertilization, insect management, and irrigation practices for the duration of the trials.

Disease severity at the Wellton location was high compared to that at the Yuma site, as shown by the percentage of dead or diseased plants for varieties planted at both locations. Romaine cultivars performed extremely well, with 1 to 2% affected plants, even at the Wellton location that had a very high level of Fusarium wilt. The two crisphead varieties Meridian and Oracle were least affected by Fusarium wilt among crisphead varieties in the Wellton trial, compared to virtually complete loss for all other crisphead varieties. In the Yuma trial, 3 and 2% of Meridian and Oracle plants, respectively, were dead or diseased, compared to values ranging from 2 to 43% for all other crisphead varieties at this site.

Lettuce variety[z]	Percentage of plants dead or diseased at crop maturity [y]	
	Trial 1 (Wellton)	Trial 2 (Yuma)
Del Sol (R)	1 f	2 i
Duquesne (R)	1 f	2 i
King Henry (R)	1 f	-----
Valley Heart (R)	1 f	-----
Meridian (EXP 12M)	8 e	3 hi
Oracle (EXP 6362)	13 d	2 i
16C652	-----	2 i
16C653	-----	2 i
16C655	-----	3 hi
16C656	-----	3 hi
16C654	-----	4 g-i
Midway	-----	6 e-i
16C657	-----	8 d-f
Desert Eagle	-----	9 de
Raider	95 c	8 d-f
AU4204LD	96 bc	8 d-f
LT4083	98 ab	12 d
Tamarack	98 ab	24 c
Pybas 7101a	99 a	8 d-f
1221	99 a	-----
El Guapo	99 a	29 b
Showtime	-----	43 a
LSD ($P = 0.05$)		

[z] (R) denotes romaine varieties. All other entries are crisphead varieties.

[y] Disease severity was recorded at plant maturity in both trials. Values in each column followed by a different letter are significantly different from each other according to Fisher's Protected LSD Test ($P = 0.05$).